Assessment of the Potential for Conflict between Existing Ocean Space Use and Renewable Energy Development off the Coast of Oregon

Colleen Sullivan

MS Thesis Defense

June 5 2012

ACKNOWLEDGEMENTS

- Dan Hudgens and the team at IEc
- Tanya Haddad, Andy Lanier, Jason Busch, and the many other patient folks with ocean space use data
- Committee
  - Dawn Wright
  - Flaxen Conway
  - Julia Jones
  - Yvette Spitz
- Family, Friends, OSU Community

OUTLINE

- Background
- Methods
- Results
- Discussion
- Conclusion

oregonwave.org

ECOSYSTEM BASED MANAGEMENT (EBM)

- A framework that requires analysis of connections among components of the marine ecosystem
  - Requires collaboration among participants
  - Has as a goal achievement of multiple objectives
- A move away from single-sector management

MARINE SPATIAL PLANNING (MSP)

- One of many tools under the umbrella of EBM
  - Space-oriented decision making tool to efficiently identify stakeholders, conduct outreach, and mitigate conflict
  - Considers the spatial arrangement of ecologic, economic, and social needs met by ocean space use
  - Identifies compatible uses and where they are located
- Zoning in the last frontier…
- Stakeholder research during MSP is critical to conflict mitigation

REGULATORY FRAMEWORK FOR OFFSHORE ENERGY DEVELOPMENT

- 2005: Energy Policy Act
- 2009: Interagency Ocean Policy Task Force
  - Jul 2010: Obama signs executive order: "Stewardship of the Ocean, Our Coasts, and the Great Lakes"
    - Focus is on EBM, MSP
    - Responsible mitigation of conflict
- Bureau of Ocean Energy Management
  - Responsible decisions especially important because of increased scrutiny
- Regional and state planning also currently embrace EBM

images from boemre.gov

ENVIRONMENTAL CONFLICT MANAGEMENT

- EBM for conflict management requires:
  - Achievement of multiple objectives
    - Compatible uses
  - Explicit decisions as to trade-offs
- Two categories of ocean space use: (Sørensen et al. 2003)
  - Where existing regulations restrict access (and conflict)
    - Shipping routes, military grounds, marine protected areas
    - Compatibility with development straightforward…
  - Conflicting use occurs
    - Fishing grounds, cultural areas
    - Compatibility with development unclear…

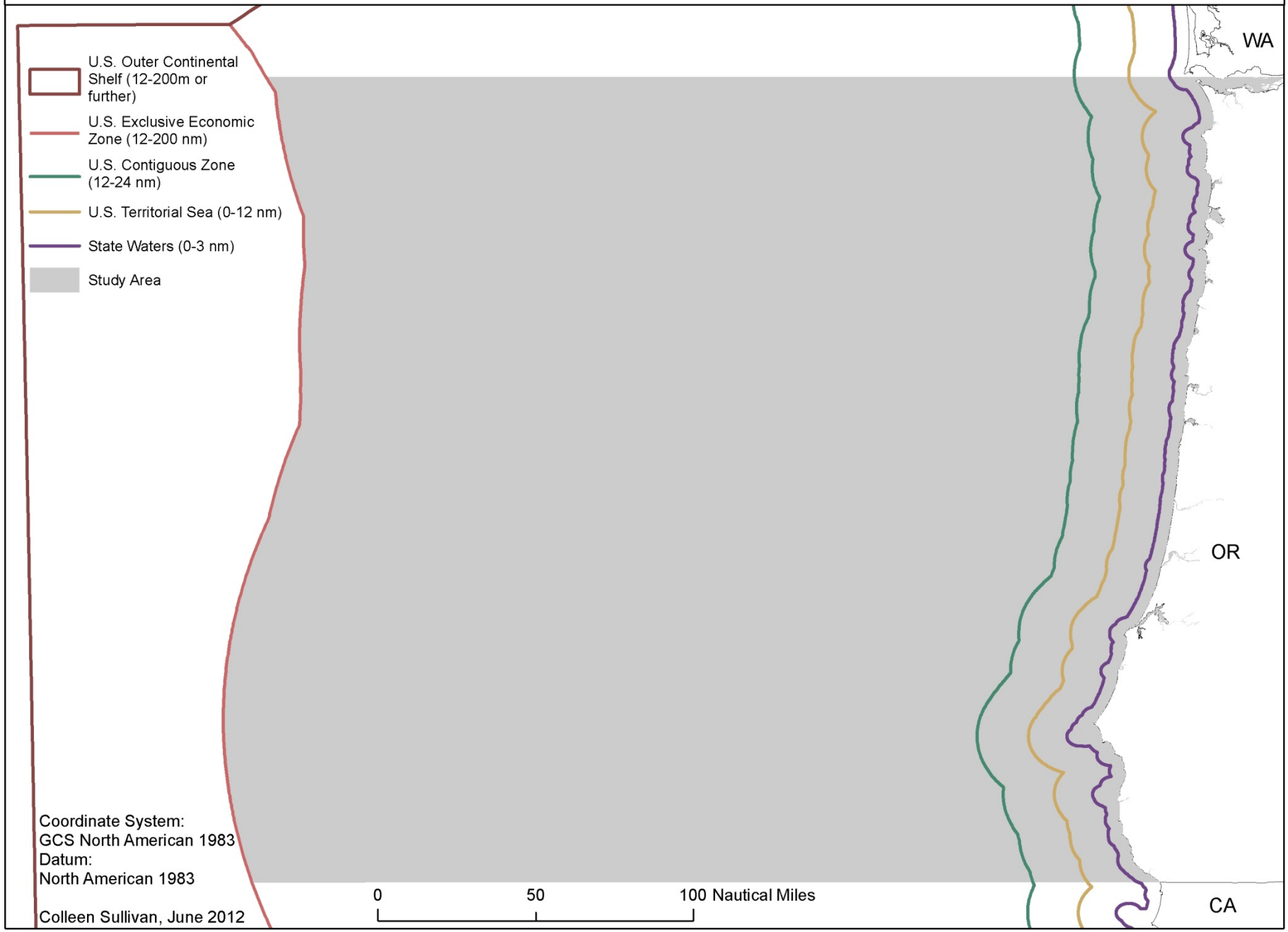
in: Industrial Economics, Inc. 2012. *Identification of OCS renewable energy space-use conflicts and analysis of potential mitigation measures*. Herndon, VA: U.S. Department of the Interior, Bureau of Ocean Energy Management.

RESEARCH QUESTION

- Goal: Create a visualization of the potential for conflict, using spatial data in a GIS

- Hypothesis: There are many categories of overlapping ocean space use such that using model results can help managers to pinpoint the key stakeholders in an area and to target areas for development where fewer use groups are present

Study Area and Jurisdictional Boundaries of the U.S.



OCEAN SPACE USE DATA COLLECTION

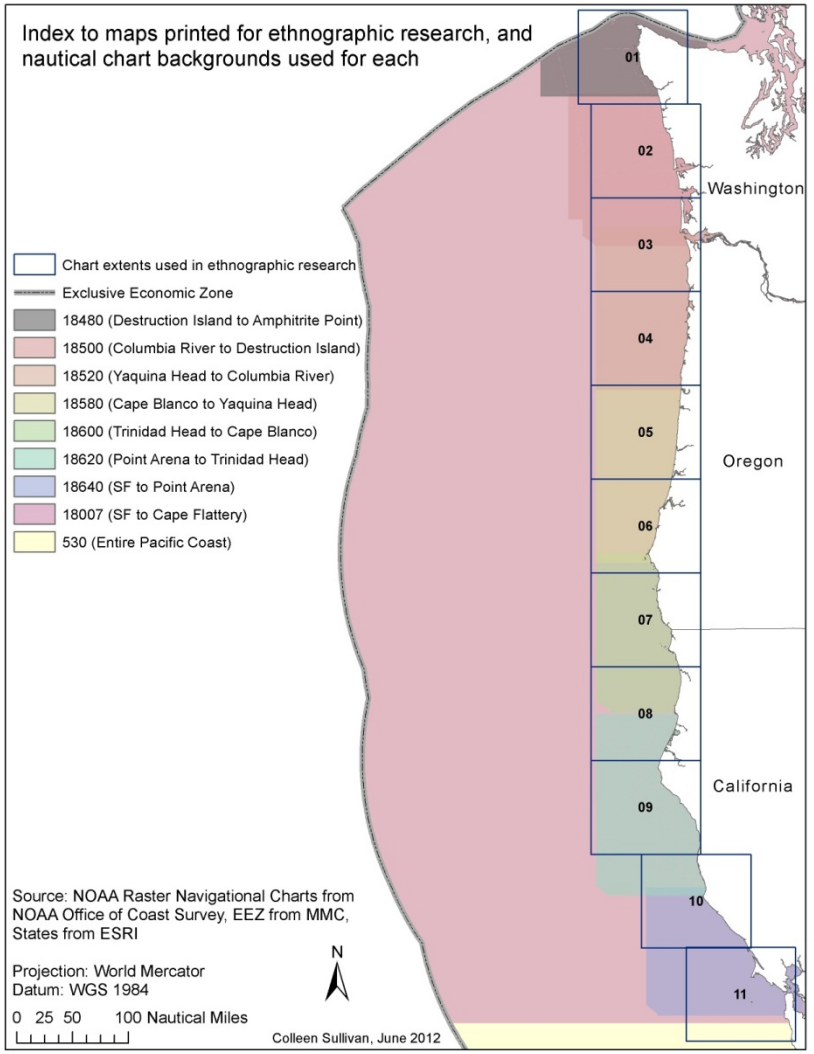
- Federal, State, and nongovernmental GIS data clearinghouses
- Internet searches for spatial data (e.g., coordinates of dive sites, shipwrecks, etc.) to create shapefiles
- Metadata
  - Email conversations with 60 individuals to get it up to FGDC standards
- Access database to track shapefiles

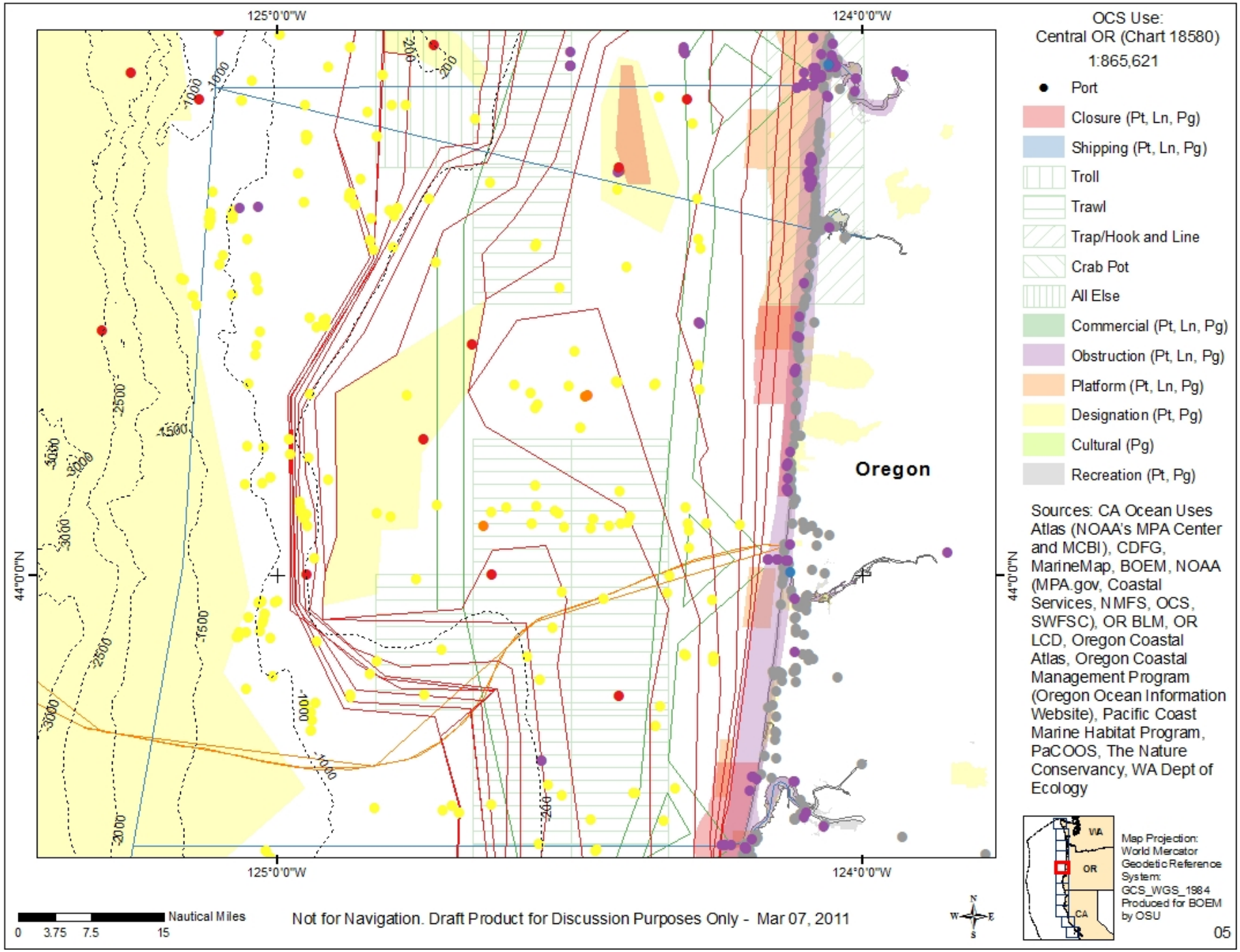
Data Sources:
BOEM/NOAA, California Department of Fish and Game, Coast Guard, Dr. Flaxen Conway and Dr. Carrie Pomeroy's Interviews, Marine Map, MPA.gov, National Atlas, NOAA ENCDirect, NOAA NMFS, NOAA NWFSC, Oregon Coastal Atlas, Oregon Department of Fish and Wildlife (ODFW), Oregon Department of Land Conservation and Development (OR LCD), Oregon Geospatial Enterprise Office (GEO), Oregon SeaGrant, Pacific Coast Marine Habitat Program, PaCOOS, PSMFC/PacFIN, The Nature Conservancy, US Army Corps of Engineers, US Navy

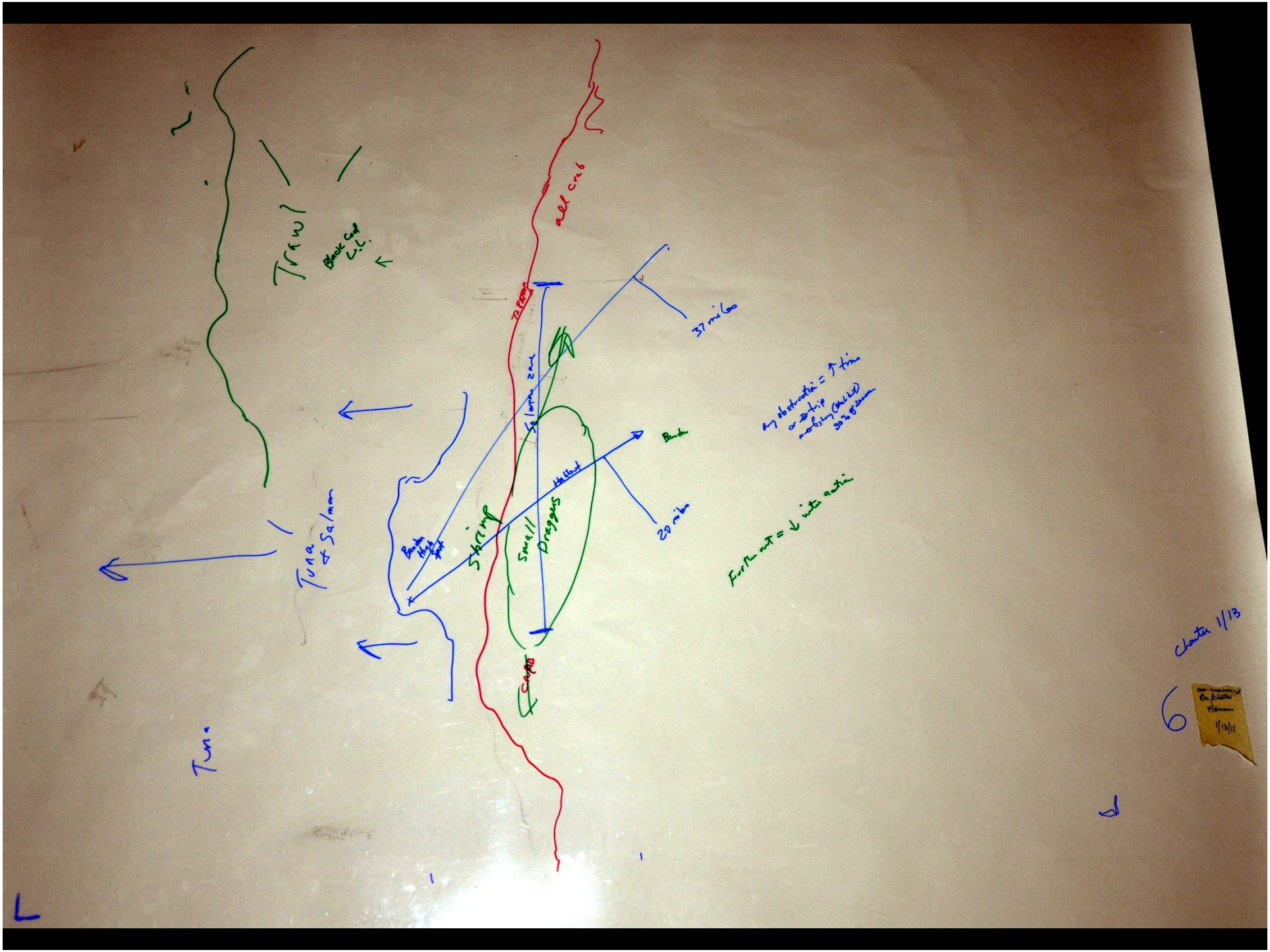
ETHNOGRAPHIC RESEARCH

- Dr. Flaxen Conway (OR Sea Grant)
- Dr. Carrie Pomeroy (CA Sea Grant)

- Commercial fishing (harvesting, processing, Native American, aquaculture)
- Commercial non-fishing (shipping, tug, service and safety)
- Non-commercial (recreational fishing and boating, scientific)

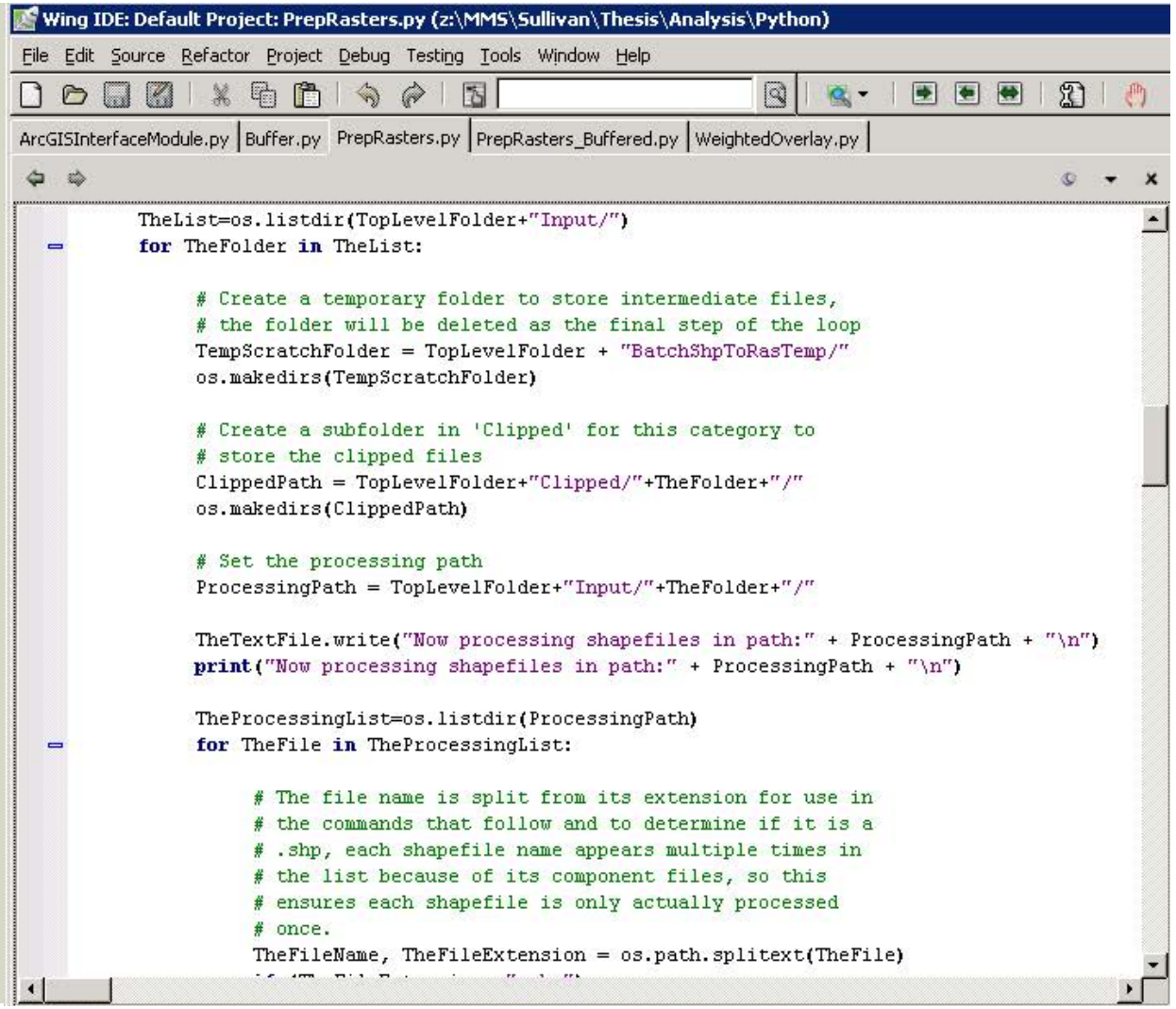



125°0'0"W
124°0'0"W
44°0'0"N
Oregon
OCS Use:
Central OR (Chart 18580)
1:865,621
Port
Closure (Pt, Ln, Pg)
Shipping (Pt, Ln, Pg)
Troll
Trawl
Trap/Hook and Line
Crab Pot
All Else
Commercial (Pt, Ln, Pg)
Obstruction (Pt, Ln, Pg)
Platform (Pt, Ln, Pg)
Designation (Pt, Pg)
Cultural (Pg)
Recreation (Pt, Pg)
Sources: CA Ocean Uses Atlas (NOAA's MPA Center and MCBI), CDFG, MarineMap, BOEM, NOAA (MPA.gov, Coastal Services, NMFS, OCS, SWFSC), OR BLM, OR LCD, Oregon Coastal Atlas, Oregon Coastal Management Program (Oregon Ocean Information Website), Pacific Coast Marine Habitat Program, PaCOOS, The Nature Conservancy, WA Dept of Ecology
WA
OR
CA
Map Projection: World Mercator
Geodetic Reference System: GCS_WGS_1984
Produced for BOEM by OSU
05
Nautical Miles
0 3.75 7.5 15
Not for Navigation. Draft Product for Discussion Purposes Only - Mar 07, 2011
N
W E
S


Trawl
Black Cod L.L.
Tuna & Salmon
Tuna
all crab
72 PATTERN
Salmon zone
Shrimp
Small Draggers
Halibut
Bandon
Bandon High Spot
37 miles
20 miles
Any obstruction = ↑ time or ↓ trip
Further out = ↓ inter action
Chester 1/13
6
1/13/11

DATA CLEAN-UP AND INPUT PREPARATION

- 488 data layers in WA, OR, CA from 32 sources
- Re-examined data with coverage in OR
  - Result: 127 shapefiles in 26 categories
- Python code to create category rasters
  - 1 nm^2 grid

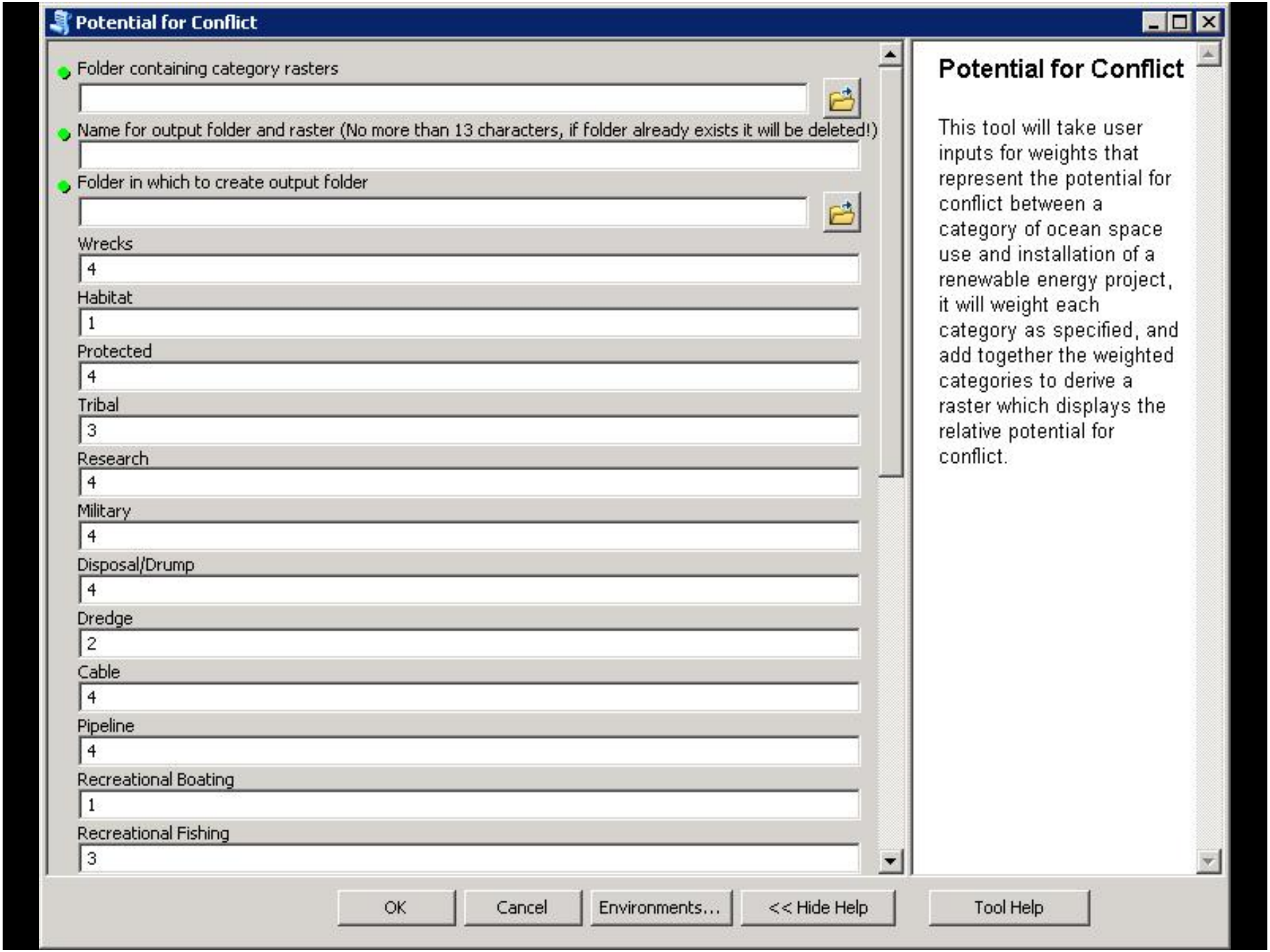


CONFLICT ANALYSIS MODEL: INPUTS

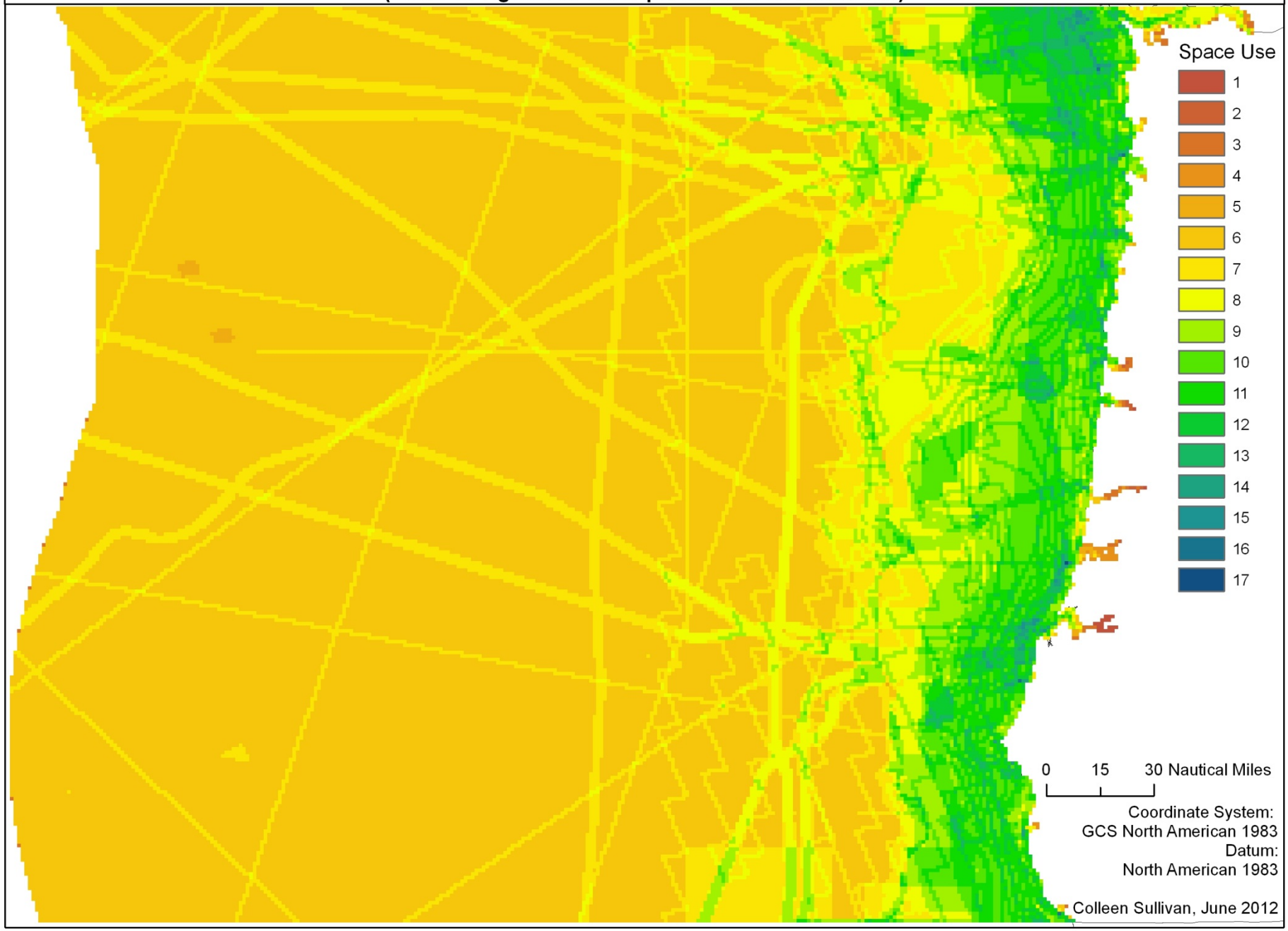
Conflict Rank	*Activity is present and…*
1	Poses little potential for conflict, possibly even compatible with renewable energy development
2	Poses some potential for conflict that could probably be mediated
3	Poses likely potential for conflict requiring in-depth negotiation that could be successful depending on location targeted
4	Poses nearly insurmountable potential for conflict

- Ranking based on user's perception of its compatibility or lack thereof with development
- Output will then show an ordinal scale of potential for conflict

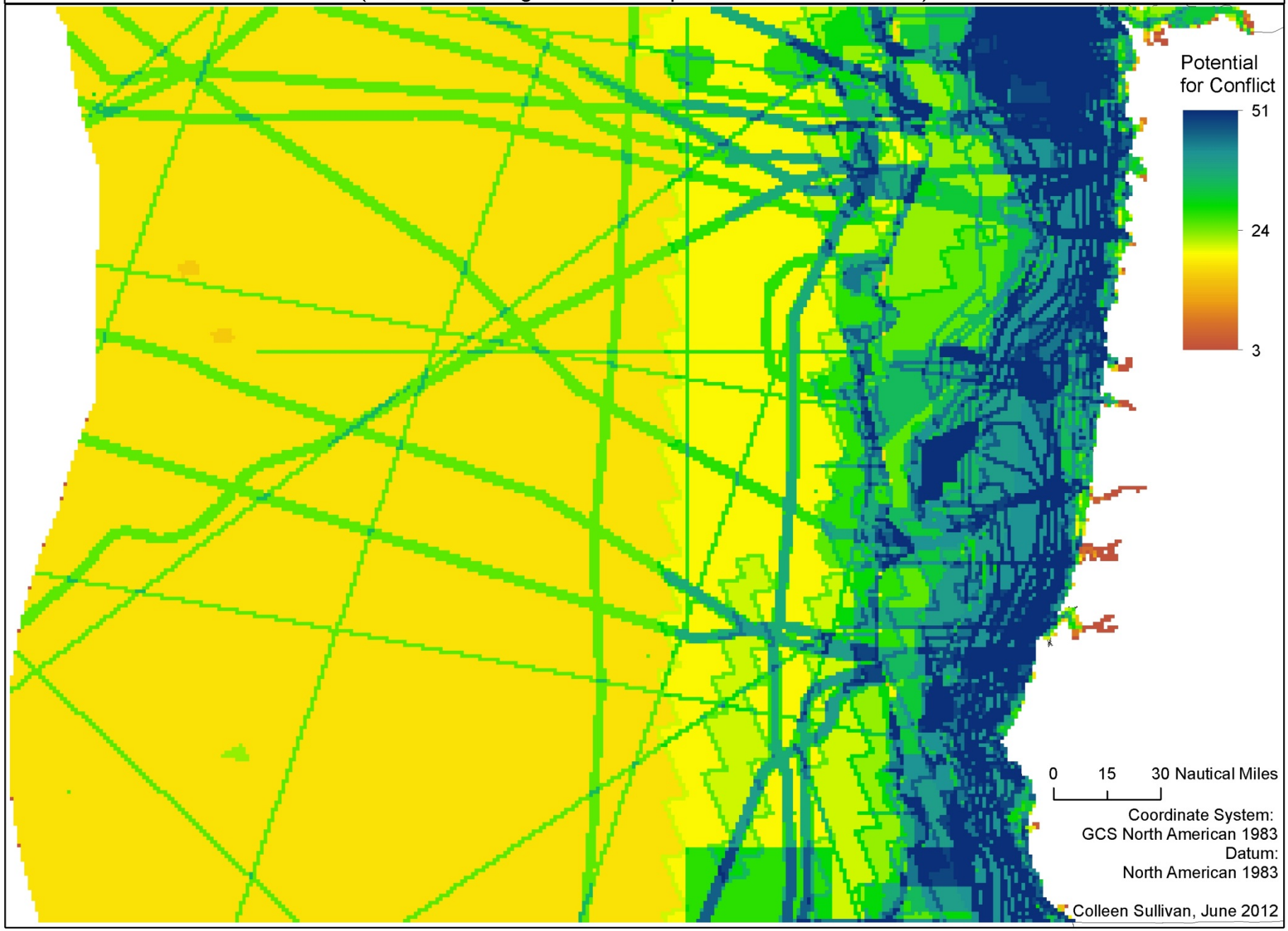
Data category	*Weight*
Wrecks	4
Habitat	1
MMA, MPA, MR, WR	4
Native American	3
Research - Sampling location	4
Military	4
Disposal/Dump	4
Dredge	2
Cable	4
Pipeline	4
Recreational - Boating	1
Recreational - Fishing	3
Recreational - Wildlife Viewing	2
Recreational - Other (e.g. surfing)	2
Marine Transportation - High Intensity	4
Marine Transportation - Moderate Intensity	3
Marine Transportation - Low to Moderate Intensity	2
Marine Transportation - Low Intensity	1
Marine Transportation - Navigation Aid	2
Fishing - Closure Areas	4
Fishing - Other Gear Types	3
Fishing - Line	4
Fishing - Pots	3
Fishing - Trap	3
Fishing - Trawls	3
Fishing - Trolling	3

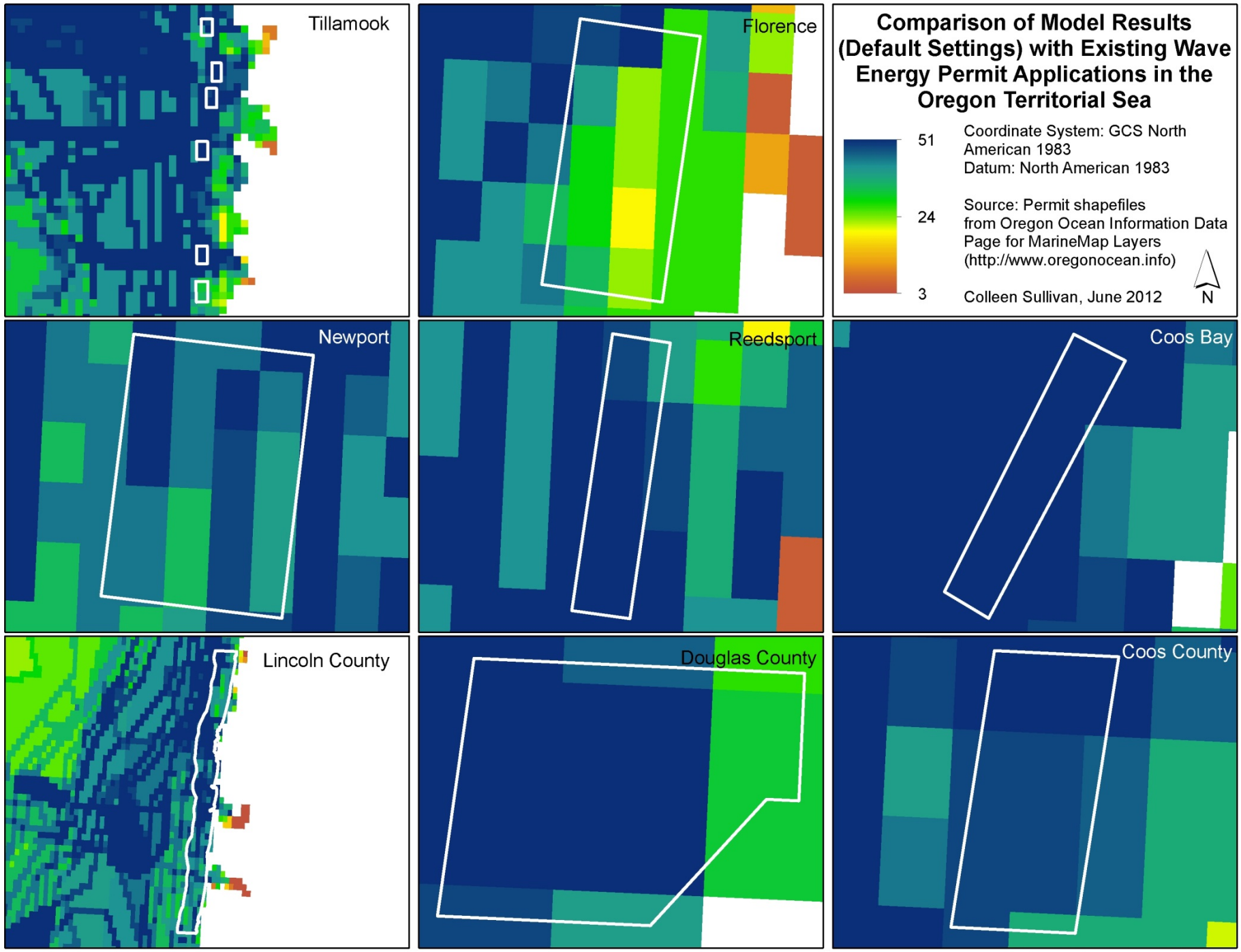

Potential for Conflict
Folder containing category rasters
Name for output folder and raster (No more than 13 characters, if folder already exists it will be deleted!)
Folder in which to create output folder
Wrecks
4
Habitat
1
Protected
4
Tribal
3
Research
4
Military
4
Disposal/Drump
4
Dredge
2
Cable
4
Pipeline
4
Recreational Boating
1
Recreational Fishing
3
Potential for Conflict
This tool will take user inputs for weights that represent the potential for conflict between a category of ocean space use and installation of a renewable energy project, it will weight each category as specified, and add together the weighted categories to derive a raster which displays the relative potential for conflict.
OK
Cancel
Environments...
<< Hide Help
Tool Help

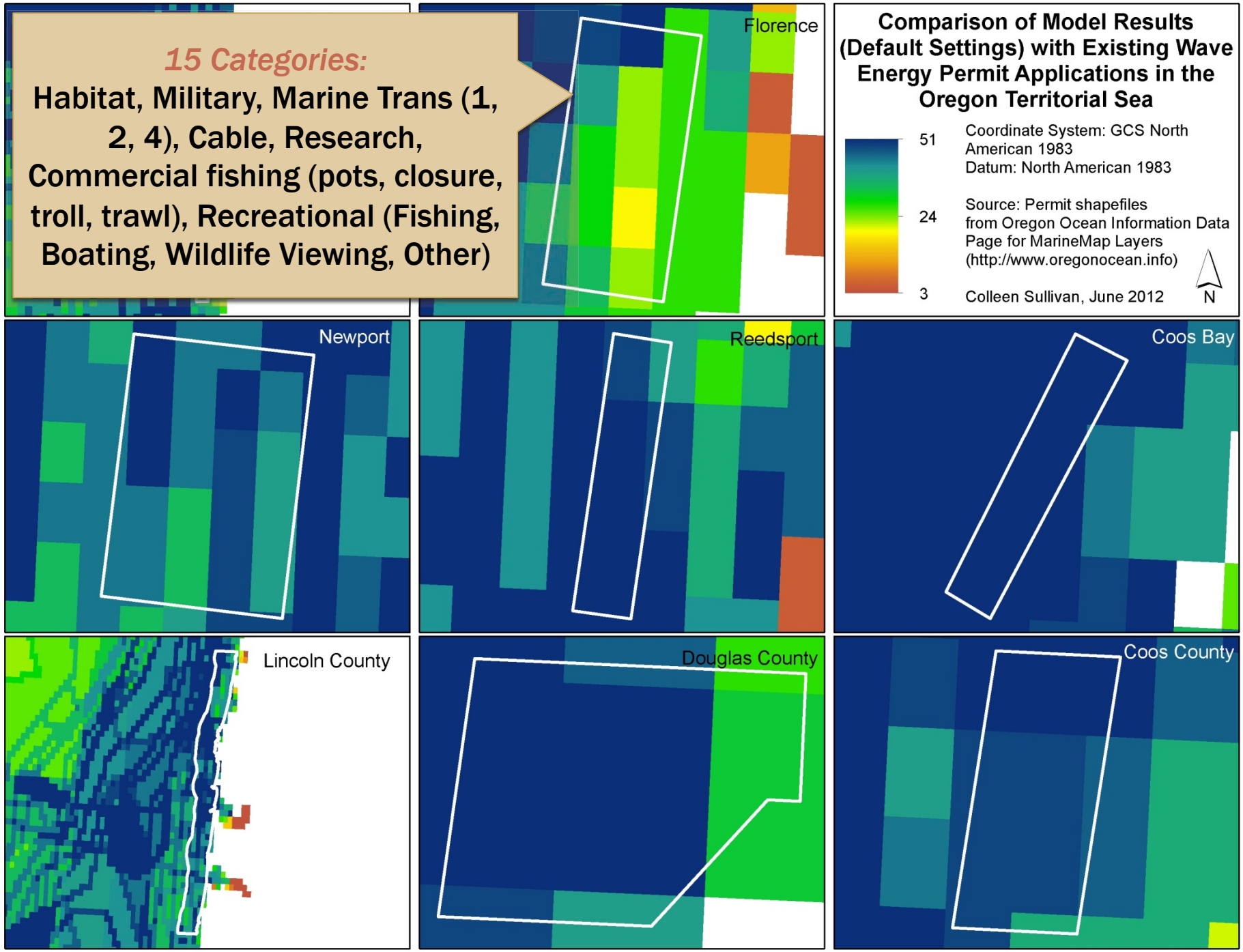
Presence of Ocean Space Use in the Study Area
(Value of 1 given to all 26 parameters in model run)



Potential for Conflict Between Existing Ocean Space Use and Renewable Energy Development in the Study Area
(Default values given to all 26 parameters in model run)




Tillamook
Florence
Comparison of Model Results (Default Settings) with Existing Wave Energy Permit Applications in the Oregon Territorial Sea
51
24
3
Coordinate System: GCS North American 1983
Datum: North American 1983
Source: Permit shapefiles from Oregon Ocean Information Data Page for MarineMap Layers (http://www.oregonocean.info)
Colleen Sullivan, June 2012
N
Newport
Reedsport
Coos Bay
Lincoln County
Douglas County
Coos County


15 Categories:
Habitat, Military, Marine Trans (1, 2, 4), Cable, Research, Commercial fishing (pots, closure, troll, trawl), Recreational (Fishing, Boating, Wildlife Viewing, Other)
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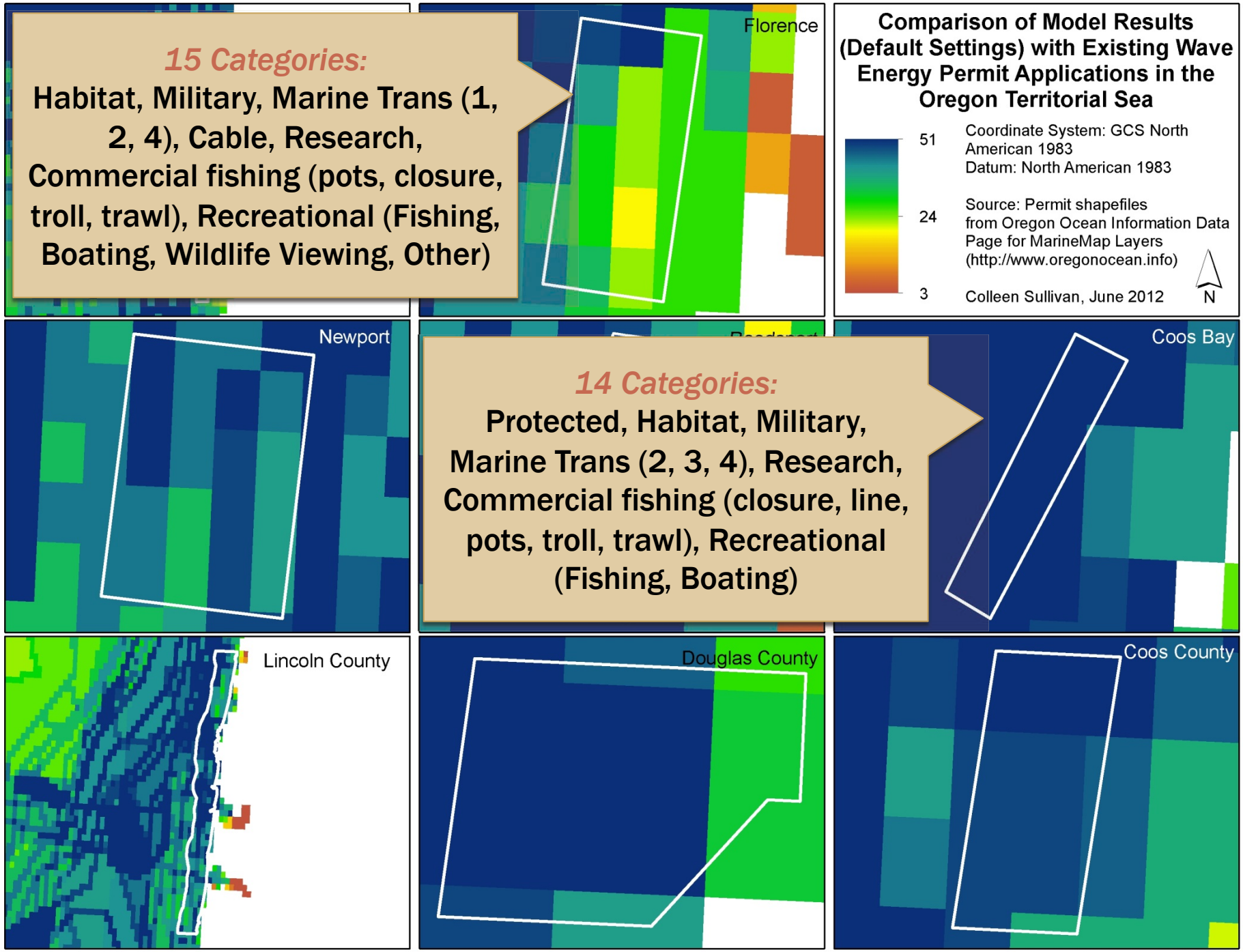
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Newport
14 Categories:
Protected, Habitat, Military, Marine Trans (2, 3, 4), Research, Commercial fishing (closure, line, pots, troll, trawl), Recreational (Fishing, Boating)
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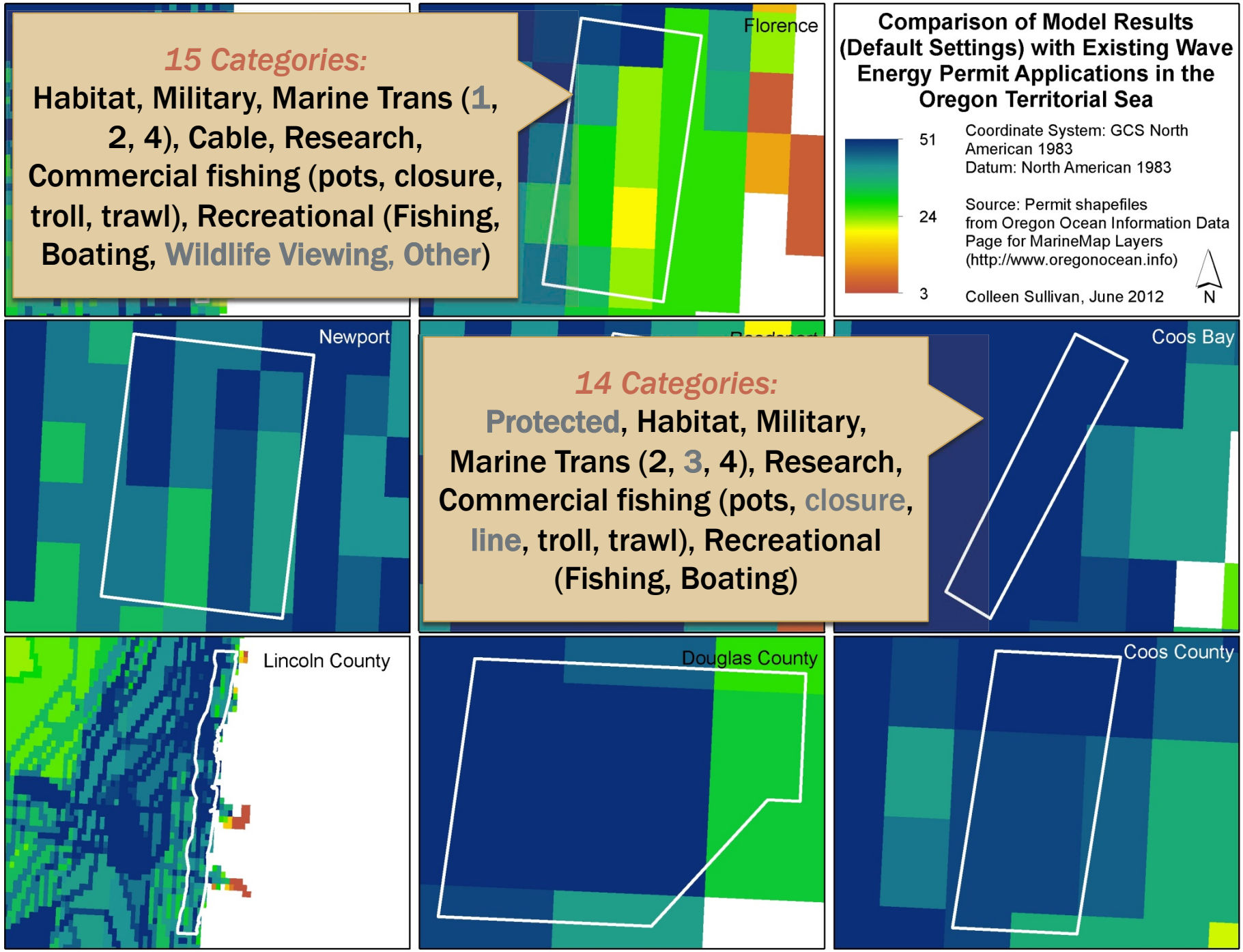
Coos County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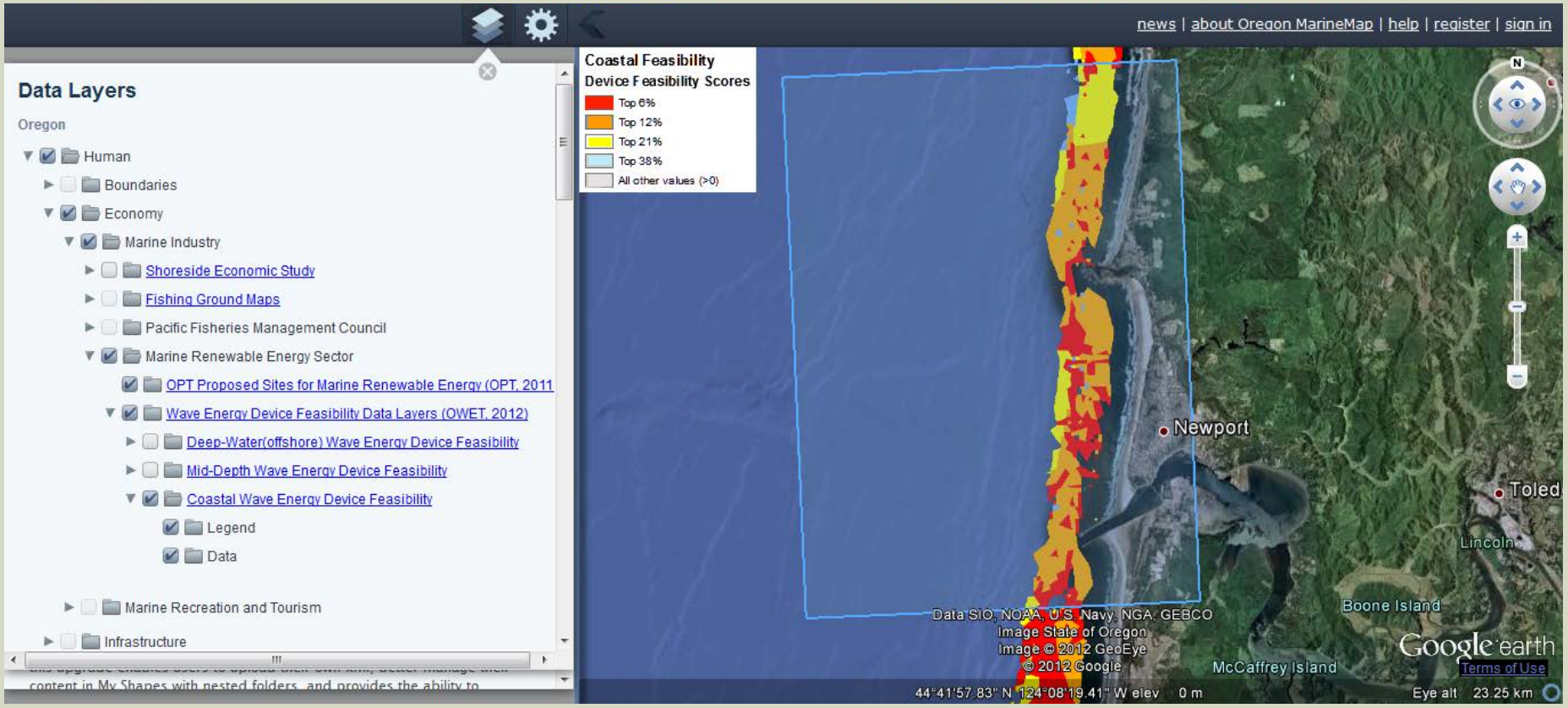
Coos County

OREGON WAVE ENERGY TRUST – DEVELOPMENT FEASIBILITY DATA

- Technical and economic feasibility
- Provided to DLCD in hopes of consideration in the TSP update



ZONAL STATISTICS

Coastline converter and coastal surge devices

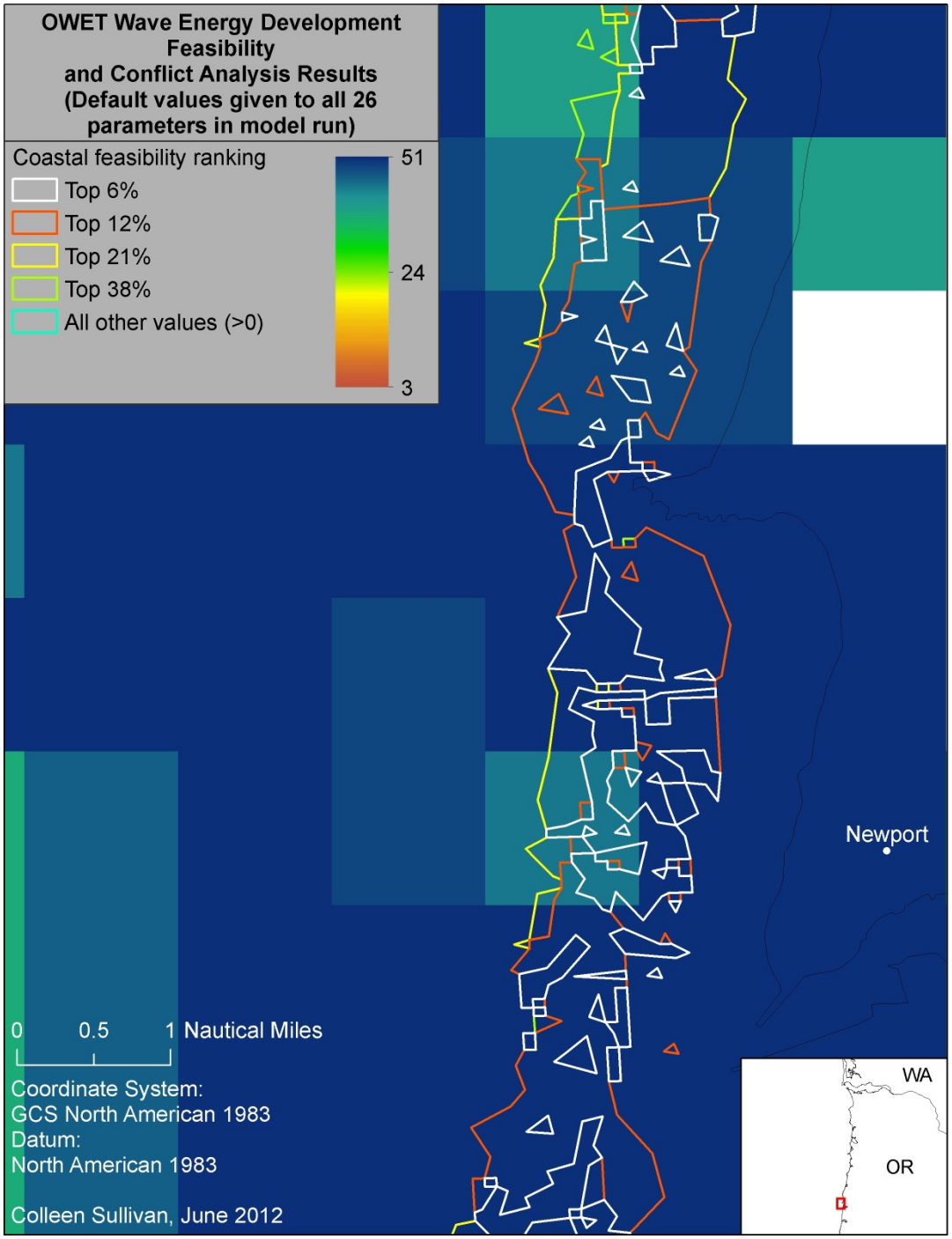
	Area (mi^2)	Min	Max	Mean	St. Dev.
Top 6%	10.8	22	51	32.1	5.3
Top 12%	10.6	22	41	30.6	4.1
Top 21%	14.9	18	41	31.0	4.8
Top 38%	38.9	18	45	29.1	5.5
All Other Values (>0)	97.5	18	44	28.8	4.8

Mid-depth devices

	Area (mi^2)	Min	Max	Mean	St. Dev.
Top 6%	81.3	18	51	31.2	5.0
Top 11%	79.6	18	51	30.7	5.6
Top 20%	125.2	18	51	30.2	5.4
Top 41%	356.9	18	43	30.6	4.9
All Other Values (>0)	1479.5	18	47	31.6	4.6

Deep water devices

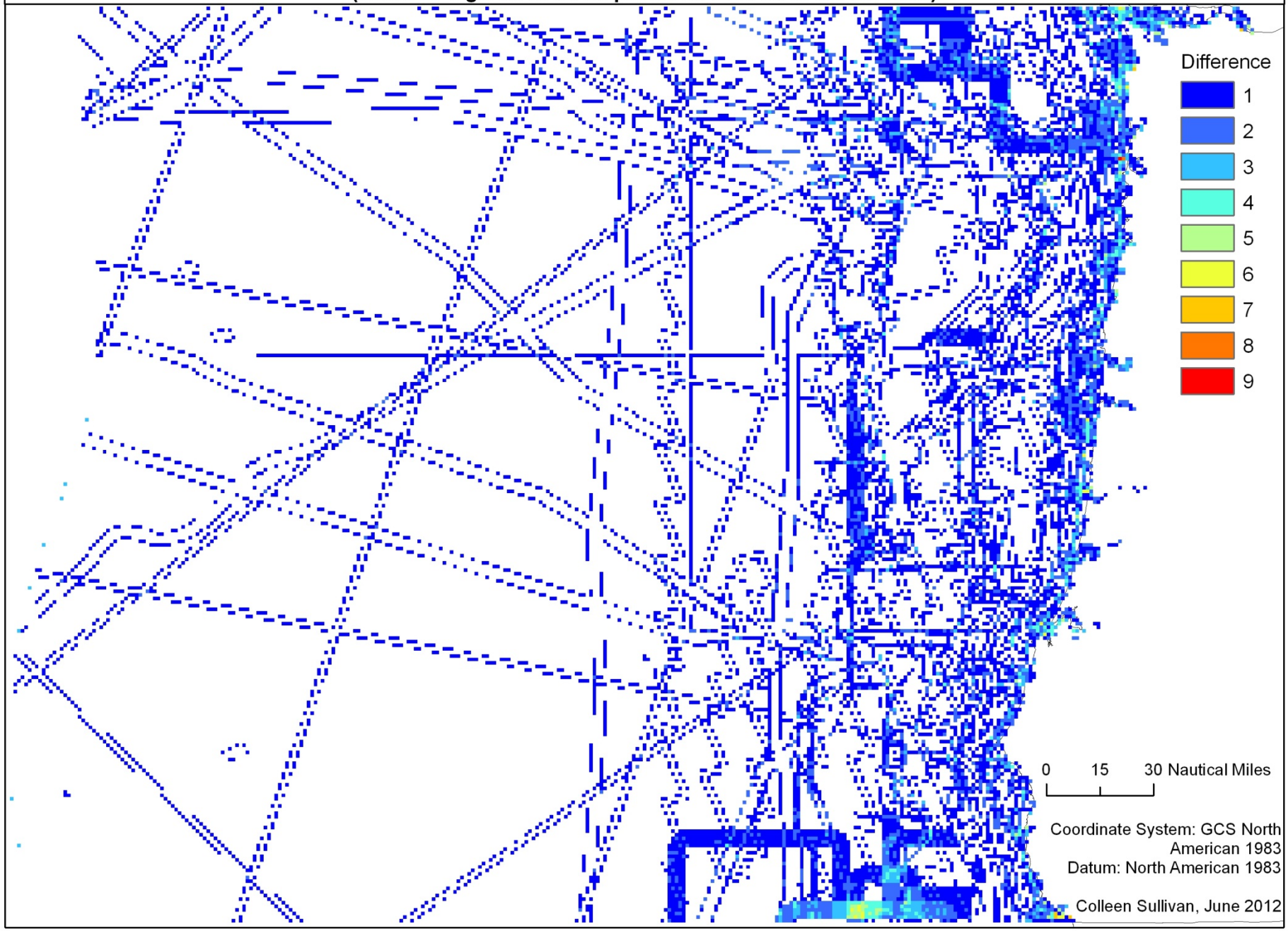
	Area (mi^2)	Min	Max	Mean	St. Dev.
Top 5%	108.9	23	43	33.5	4.6
Top 11%	143.9	20	51	32.9	4.3
Top 20%	186.1	19	47	32.3	4.6
Top 41%	490.1	18	51	31.7	4.5
All Other Values (>0)	1706.1	18	47	31.7	4.1



UNCERTAINTY

- All maps contain uncertainty
- Important for decision-makers to understand its sources and implications
  - Improve credibility
- Created a visualization of uncertainty to convey what is known about the data quality and guard against inappropriate applications
- Ideally: calculate positional accuracy
- Proxy: clues in the metadata
  - 42 of the 127 shapefiles had concrete clues as to horizontal accuracy
  - BUT only the logbook data resulted in a buffer distance > .5 nm
- Python code to buffer the input shapefiles, re-do the input category rasters

Representation of uncertainty: Buffered Model Result - Standard Model Result
(Value of 1 given to all 26 parameters in both model runs)



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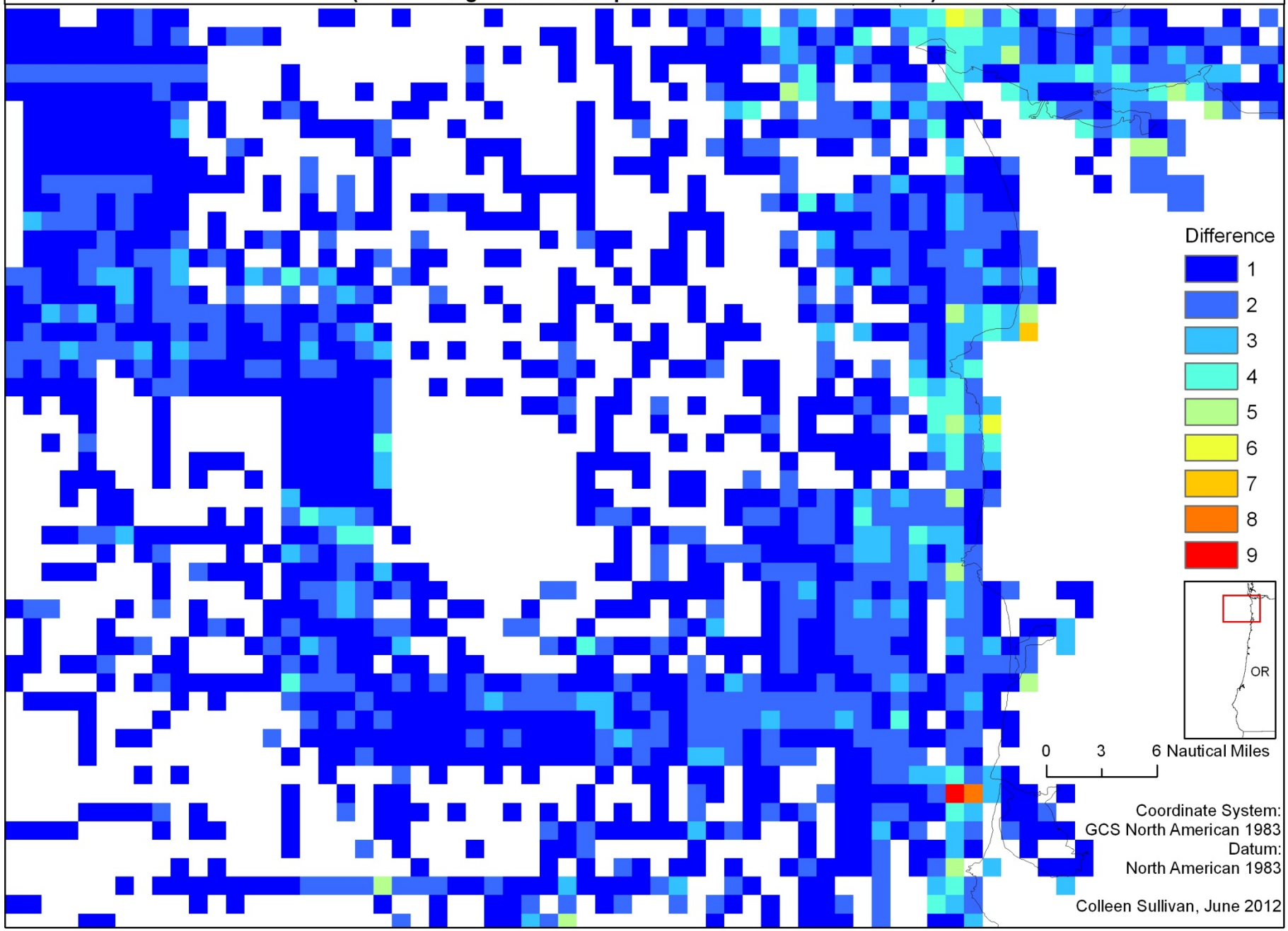
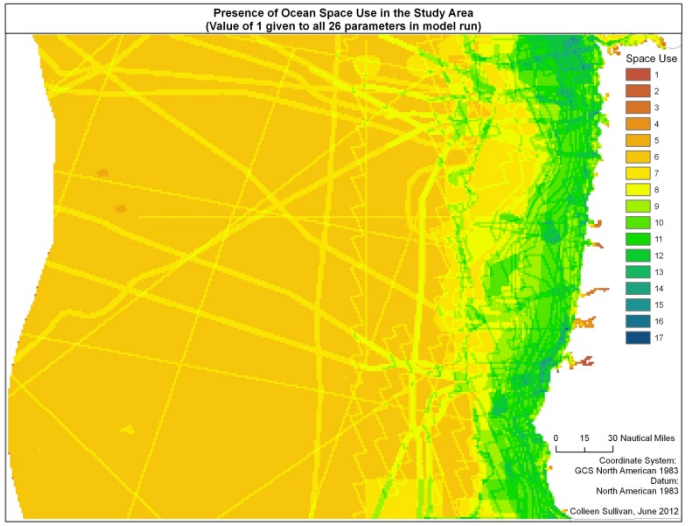
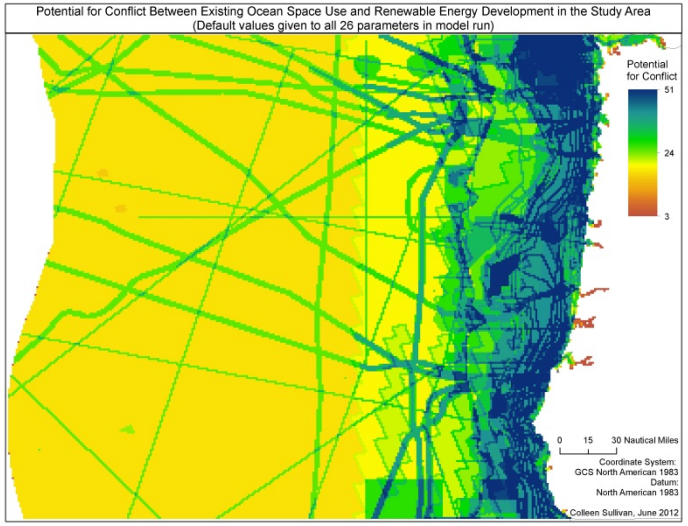


DISCUSSION

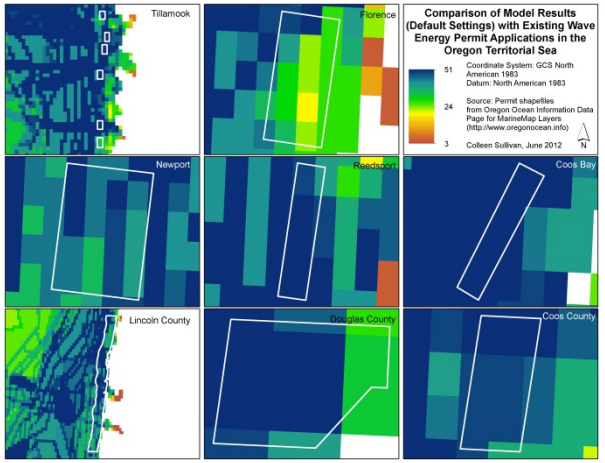
- Results demonstrate the extent of overlap among ocean space use categories
  - 17 in a nm^2 cell
  - Most have at least 6
- Concentrated between coast and 30 nm at sea

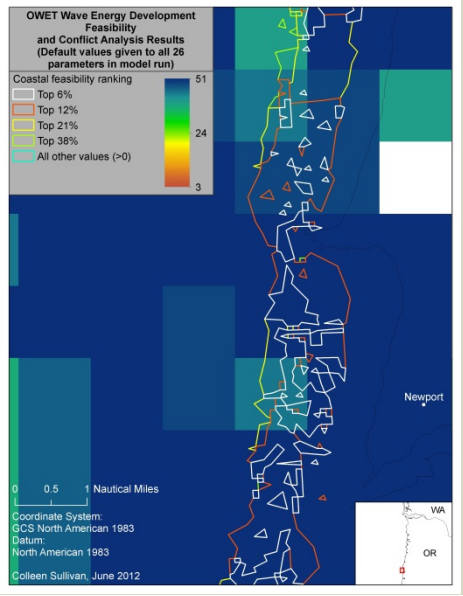




DISCUSSION

- Comparison to permit sites showed relative potential for conflict and stakeholders present
- Comparison to wave energy development feasibility showed key parallels
  - Direct relationship between suitability and conflict
    - Similar criteria
      - 20 nm of a deepwater port
      - Seafloor type: sand and mud
- Caveats to results
  - Snapshot in time
  - Uncertainty of input data
  - Coastal communities





CONCLUSION

- Mitigation of conflict between development and existing space use is not merely a best practice supported by current policy, but a necessity
- Shows contentious areas and input data quickly shows which stakeholder categories are present
  - Initial research and outreach
- Model can help interested parties understand one another and the big picture
- Can assist EBM
  - Can be adapted to other regions and scales

"The ocean is huge, but how huge it feels depends on how concentrated any resource is" (Conway 2012, 49).

image from Lisa DeBruyckere

Conway, F. 2012. *Preliminary Findings from Stakeholder Outreach in Oregon and Washington.*

conflict
space
Oregon
development
use
management
data
model
analysis
ocean
energy
results
Ocean
potential
area
used
Marine
Management
uncertainty
category
ecosystem
Industrial
Policy
Fishing
research
process
fishing
may
raster
shapefile
values
using
Results
Conflict
must
MSP
social
fishermen
BOEM
specific
value
nm
help
Uncertainty
one
support
associated
provided
information
points
state
coast
U.S
field
provide
existing
spatial
maps
Table
shipping
Rosenberg
high
stakeholders
assigned
method
trade-offs
Science
Press
policy
managers
default
GIS
Inc
California
fish
cells
range
given
scale
error
input
line
gear
increased
last
digitized
stakeholder
folder
parameters
Coast
metadata
categories
EBM
grid
distance
interest
uses
set
appropriate
shapefiles
marine
Bolstad
show
closure
Conway
study
siting
ArcGIS
Washington
tool
project
section
wave
decisions
Leslie
created
commercial
Economics
accuracy
recreational
Pomeroy
federal
difference
groups
positional
Longley
buffer
suitability
McLeod
includes
example
also
planning
shore
within
Energy
offshore
cell
sites
species
ranking
users
waters
time
order
run